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Enrique J. Galvez
Jesper Glückstad
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Introduction

Complex Light and Optical Forces had its ninth meeting 11–12 February 2015, in San Francisco, California, United States. It was particularly auspicious timing to have a conference on fundamental and applied aspects of light in 2015, designated the International Year of Light. The conference was held in the backdrop of a beautiful city, which enjoyed exceptionally good weather in the days of the conference.

The conference had 33 presentations that included 3 posters. Session titles were "Optical Beam Sculpturing," "Polarization in Complex Light," "Quantum Effects," "Quantum Complex Light," "Optical Tweezers," "Optical Flows," and "Optical Forces." An additional session on "Structured Light in Photonics Instrumentation" was held jointly with the conference on Photonics Instrumentation Engineering II.

Cementing its unofficial role as the yearly outlet for research on the fundamentals of complex light and optical manipulation, the conference presentations and the papers in this volume reflect the state of the art research in the field. They included new in-depth understanding of complex light fields, in problems such as optical healing and revival, or in the unraveling of the exquisite complexity that is present in space-variant polarization fields. The modes of light also continue to further our understanding of quantum mechanics, and unravel the role of complex light in encoding quantum information for communication and computation. The conference included healthy debates on the classical-quantum boundary. It also highlighted new technological devices that advance the manipulation of phase and polarization of designer beams to yet higher levels of sophistication. This control of light has enabled new ways of facilitating the interaction between light and matter, such as the use of optically manipulated conduits to channel the light and deliver radiation pressure or the spectral content to matter in new ways and from directions not previously accessible. Such unraveling of light complexity has also led to proposals for new forces and interactions between light and matter, which are the seeds for future research.

The contributions in this volume are representative of the latest research in the field, and as presented at the meeting, underscore the vitality of an exciting topic of research and technology that studies and uses light in all of its complexity.

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